SEMESTER END EXAMINATION, DECEMBER 2024

Course Name: - B. Tech(CSE) Semester: - 3
Paper Name: - Soft Computing Paper Code: - TCS 301
Time - 3Hrs + 20 minutes per hour extra time for V.I. & examinees with writer. Max Marks-70
समय – 3 घण्टे 20 मिनट प्रति घंटे अतिरिक्त–दृष्टिबाधित एवं सहलेखक परीक्षार्थियों के लिए। अधिकतम अंक–70

Instructions:

- The question paper consists of three sections namely A, B, C. All sections are compulsory.
- Section A- Each question carries 03 marks. All questions are compulsory.
- Section B- Answer any 5 out of 7 given questions. Each question carries 7 marks.
- Section C- Answer any 2 out of 3 given questions. Each question carries 10 marks.
- Section D- Each question carries 02 marks. All questions are compulsory.

Section – A खण्ड–अ
Objective Questions

1. Answer all the following questions. 5×3=15
निम्नलिखित सभी प्रश्न अनिवार्य हैं।

(i) What is the characteristic of hard computing?
A) High tolerance to imprecision
B) Exact solutions
C) Heuristic search
D) Learning capability

(ii) Reinforcement learning involves:
A) Supervision from labeled datasets
B) Learning through rewards and penalties
C) Clustering similar data points
D) Finding a decision boundary

(iii) The fitness function in a genetic algorithm is used to:
A) Determine which individuals survive
B) Generate random individuals
C) Perform crossover operations
D) Apply mutation

(iv) A biological neural network consists of:
A) Artificial neurons
B) Synapses, dendrites, and axons
C) Activation functions
D) Binary inputs and outputs

(v) Which is not a membership function type?
A) Triangular
B) Trapezoidal
C) Sigmoid
D) Binary

Section – B खण्ड–ब
Short Answer Questions (लघुउत्तरीय प्रश्न)

2.Answer any five of the following questions. 5×7=35

निम्नलिखित में से किन्हीं 5 प्रश्नों के उत्तर दें।

(i) Explain the difference between hard and soft computing, including their characteristics and real-world applications.

(ii) Draw and explain the flowchart of a genetic algorithm, detailing the key operations like selection, crossover, and mutation.

(iii) Describe the role of synapses, axons, and dendrites in a biological neural network.

(iv) Discuss how feedback networks handle sequential data and their limitations.

(v) Discuss the criteria for choosing an appropriate activation function for a neural network model.

(vi) Compare fuzzy sets and crisp sets with examples.

(vii) Compare hetero-associative and auto-associative neural networks, highlighting their structure and applications.

Section – C खण्ड–स
Descriptive Questions

3.Answer any 02 question of the following questions. 2×10=20

निम्नलिखित में से किन्हीं 2 प्रश्न के उत्तर दें।

(i) Analyze the limitations and challenges of neural networks in terms of training time, data requirements, and interpretability.

(ii) Describe three real-world problems solved effectively by genetic algorithms and how the algorithm works in each case.

(iii) Provide a real-world example illustrating the conversion between crisp and fuzzy values.

Section – D खण्ड द
Objective Questions

Max. Marks:20

4. Answer all the following questions. 10×2=20

निम्नलिखित सभी प्रश्न अनिवार्य हैं।

I. Genetic algorithms are used to solve:
- A) Linear equations
- B) NP-hard problems
- C) Binary search problems
- D) Compiler errors

II. A fuzzy controller is widely used in:
- A) Database design
- B) Washing machines
- C) Sorting algorithms
- D) Binary search

e basic unit of a
A) Neuron
B) Synapse
C) Axon
D) Dendrite

IV. The main difference
A) Number of

...ne basic unit of an artificial neural network is called:

A) Neuron
B) Synapse
C) Axon
D) Dendrite

IV. The main difference between feedforward and feedback networks is:

A) Number of neurons
B) Presence of loops
C) Training algorithms used
D) Number of layers

V. The crossover operation in genetic algorithms:

A) Generates the initial population
B) Combines genetic information of parents
C) Applies fitness evaluation
D) Mutates the offspring

VI. Which of the following is a supervised learning algorithm?

A) K-Means Clustering
B) Decision Trees
C) Q-Learning
D) Principal Component Analysis

VII. Which characteristic is associated with soft computing?

A) Deterministic reasoning
B) Stochastic reasoning
C) Exact modeling
D) Rigid frameworks

VIII. Which factor affects backpropagation performance?

A) Learning rate
B) Number of layers
C) Initialization of weights
D) All of the above

IX. Which is an advantage of neural networks?

A) Ability to learn patterns
B) Requires minimal computation power
C) Always deterministic
D) Handles small datasets efficiently

X. Which defuzzification method finds the center of area under the curve?

A) Centroid method
B) Mean-max membership
C) Bisector method
D) Weighted average